

Psychometric Properties of the Autism Early Interventionist Self-Efficacy Scale among Preschool Teachers of Children with Autism Spectrum Disorder

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Abstract

Early intervention programs for children with autism spectrum disorder (ASD) are primarily implemented by preschool teachers in national preschools in Malaysia. While the initial evidence supports Early Interventionist Self-Efficacy Scale's reliability and validity in assessing self-efficacy among early intervention practitioners, there is limited research on its application among preschool teachers. Thus, this study was conducted to examine the psychometric properties of the adapted version of 15-item Autism Early Interventionist Self-Efficacy Scale (AEISES) among a sample of Malaysian national preschool teachers (N = 169) who implement early intervention programs for children with ASD. The exploratory factor analysis extracted a two-factor solution for AEISES which resulted in the retention of 13 items. These factors were named Personal Intervention Efficacy (PIE) and General Intervention Efficacy (GIE). Results from the confirmatory factor analysis also indicated that the two-factor structure fits well with the data ($\chi^2/df=2.091$, CFI=0.980, RMSEA=0.080). The internal consistency of the scale was found to be excellent ($\alpha = 0.916$). The results of this study showed that the AEISES is a reliable and valid instrument for identifying self-efficacy among national preschool teachers in implementing early intervention programs for children with ASD in Malaysia.

Keywords: Self-Efficacy, Preschool Teachers, Early Intervention Programs, Children with Autism Spectrum Disorder

Introduction

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition. As defined by the Diagnostic and Statistical Manual of Mental Illnesses, Fifth Edition (DSM-5), a child must have persistent deficits of social communication and interaction plus restricted and repetitive behaviors to meet the diagnosis criteria for ASD (American Psychological Association, 2013). Globally, between 2022 and 2023, data showed an increasing prevalence

of ASD among children, from 1 in 44 children to 1 in 36 children (Gupta et al., 2025; Shaw, et al., 2025). Consistent with the global trend, Malaysia is also seeing a rising number of children with ASD. From 2019 to 2024, the number of children with ASD enrolled in national preschools almost tripled, with an increase over 160% (Special Education Division, 2019, 2024). This alarming rise highlights the need for urgent early intervention support in the national preschool setting.

Early Intervention Programs for Children with Autism Spectrum Disorder

According to Acar et al. (2019), EI programs has been developed for children with disabilities. Numerous research has shown that early intervention (EI) programs are beneficial for children with ASD (Del Sol Fortea et al., 2015; Rogers & Vismara, 2008; Starr et al., 2016; Vivanti, 2024) especially when implemented in preschool settings (Sidique et al., 2022). In particular, EI programs benefits children with ASD in many ways such as cognitive development, social skills, language and adaptive behavior skills (Boccaccio et al., 2023; Magiati et al., 2012). While EI programs are seen as beneficial, their effectiveness depends on how well teachers put them into practice.

Teachers' Self-Efficacy

According to Berman (1977), teacher self-efficacy is the most powerful variable in prediction of the success of program implementation. Teacher self-efficacy has been associated with various successful educational outcomes through effective classroom management, quality instructional approaches as well as innovative teaching strategies (Ghaith & Yaghi, 1997; Holzberger et al., 2013; Woolfolk et al., 1990). Abroampa et al. (2017) emphasized that teacher self-efficacy is an inevitable factor in their implementation of teaching strategies and curriculum. In the context of EI programs, teacher self-efficacy plays a crucial role in implementing the planned intervention.

Bandura (1977) defined perceived self-efficacy as an individual's belief in their capabilities to plan and carry out the actions needed to achieve certain goal at a designated level of performance. Building upon this conceptualization and Bandura' theory of self-efficacy, Gibson and Dembo (1984) conducted pioneering research on teacher self-efficacy and developed Teacher Efficacy Scale (TES). The theory posits that two dimensions are critical for behavioral initiation. First, outcome expectations refer to beliefs about action-outcome contingencies, specifically, whether a given behavior will lead to particular outcomes. In TES, this dimension, which is known as teacher's sense of teaching efficacy, reflects teachers' beliefs about the general impact of teaching on student outcomes, particularly when accounting for student background factors. However, Bandura (1977) argued that understanding these causal contingencies alone is insufficient to motivate behavior if individuals lack confidence in their ability to execute the required actions successfully. This confidence constitutes personal efficacy, which Gibson and Dembo (1984) operationalized as teachers' self-evaluation of their competency to influence student outcomes.

In the past, the two-factor TES had been widely employed in numerous studies from different countries to explore self-efficacy in various education contexts (Brouwers et al., 2002; Deemer & Minke, 1999; Lin & Gorrell, 2001; Yuen et al., 2003) as well as among Malaysian teachers (Abdullah & Laji, 2016; Ebbie et al., 2019; Jerry, 2010). Particularly, the Early Interventionist Self-Efficacy Scale (EISES) developed by Lamorey and Wilcox (2005) was

also adapted from TES to measure self-efficacy targeting early intervention personnels. Like the TES, the instrument comprises two subscales, the Personal Intervention Efficacy (PIE) assesses EI practitioners' evaluation of their own efficacy to implement EI programs, paralleling the personal efficacy dimension in the TES while the General Intervention Efficacy (GIE) measures EI practitioners' beliefs about the causal influence of EI programs on children's learning and developmental outcomes, with consideration of ecological risk factors. This latter subscale reflects the outcome expectation dimension of the TES. To date, EISES is one of the few available high-reliability instruments that are specially designed for use in the early intervention setting. Considering the current study set up in an early intervention setting, thus, it is rational to explore on the cultural adaptability of the EISES especially in the Malaysian preschool context.

Research Gap and Justification

In Malaysia, there are two types of national preschools that provide EI programs for children with ASD, namely the Special Education National Primary School (*Sekolah Kebangsaan Pendidikan Khas*, SKPK) and Integrated Special Education Program (*Program Pendidikan Khas Integrasi*, PPKI). It is important to note that the preschool teachers serving in the SKPK and PPKI are different from preschool teachers teaching in mainstream settings. Specifically, the former are trained to deliver the special education curriculum by considering individual needs through individualized instructional modification and adaptation. In this regard, the National Preschool Standard-Based Curriculum (*Kurikulum Standard Prasekolah Kebangsaan*) released by the Malaysian Education Ministry in 2017 emphasized on maximizing the potential of preschool children with special needs through the implementation of EI programs. Despite the heightened attention on EI programs added to the rising number of children with ASD, minimal research has focused on these preschool teachers who carry out EI programs to facilitate learning among children with ASD. To date, there is limited study in the area of self-efficacy among preschool teachers in the national preschools setting. Moreover, there is a notable absence of measurement instruments specifically designed to assess the self-efficacy of preschool teachers implementing EI programs for children with ASD.

Although the EISES has been used as a reliable practitioner efficacy scale in the early intervention setting, the scale was developed within the well-established early intervention infrastructure of the United States, where federal mandates ensure structured support systems and specialist availability. In contrast, Malaysia's early intervention services differ substantially, where community-based programs are still at the emerging phase through non-government organization's efforts. Additionally, the EISES was designed with a family-centered orientation, encompassing home-based interventions and family engagement, whereas the Malaysian national preschool context focuses specifically on school-based experiences and classroom implementation without significant emphasis on parental participation. These contextual differences may influence how preschool teachers perceive and report their self-efficacy. Second, the scale was not specifically designed to measure self-efficacy among preschool teachers implementing EI programs for children with ASD, a population with unique instructional and behavioral support needs that differ from general early intervention populations.

Thus, the scale requires both modifications to address the specific demands of implementing EI programs for children with ASD and validation for use in the Malaysian national preschool context. In this regard, the present study focuses on validating its psychometric properties of a modified version of EISES in a sample of preschool teachers who implement EI programs for children with ASD in the national preschools in Malaysia. Specifically, the present study aims (i) to confirm the existence of the two-factor structures of the modified EISES and (ii) to investigate whether the modified EISES can be a reliable and valid instrument to identify self-efficacy among preschool teachers who implement EI programs for children with ASD in Malaysian national preschools.

Research Methodology

Participants in the present study were preschool teachers who conduct EI programs for children with ASD in national preschools in Malaysia. According to Special Education Division (2023), there were a total of 242 national preschool teachers in service in the country. These preschools teachers were placed in different states throughout the country's five geographical regions, namely Southern, Central, Northern, East Coast and East Malaysia. In order to ensure better geographic representation and enhance generalizability, the researcher selected eight states with the highest number of national preschool teachers across these regions. Participants were invited from these states: Johor and Negeri Sembilan (Southern); Selangor and Wilayah Persekutuan Kuala Lumpur (Central); Perak and Kedah (Northern); Kelantan and Pahang (East Coast) plus Sarawak and Sabah (East Malaysia).

Sampling and Data Collection

In this study, purposive sampling was employed based on the judgement of the researcher to recruit the preschool teachers who were selected deliberately in order to provide important information needed for the objectives of the study (Etikan & Bala, 2017; Maxwell, 1996). In this regard, the respondents must fulfill two criteria specified by the researcher. First and foremost, the participant must be recognized as a qualified preschool teacher by the Ministry of Education of Malaysia servicing national preschools. Secondly, he or she must have experience in conducting EI programs for children with ASD in the national preschools setting. Based on these criteria, a total of 169 national preschool teachers ranging from age 23 to 53 years old were recruited ($M_{\text{age}} = 39.00$, $SD = 7.063$; 91% female).

For the purpose of generating findings with adequate statistical power, a few sample size guidelines were considered in this study. As such, a general rule of thumb recommends to have a minimum of five observations per measure with a preferable sample size of 100 or larger (Hair et al., 2006). In the present study, the measurement scale employed has 15 items. Therefore, at least 75 samples are needed to generate findings with adequate statistical power. Thus, 169 preschool teacher samples were enough to generate findings generalizable to all national preschool teachers in Malaysia.

Prior to data collection, permission was first sought from the Education Planning and Research Division (EPRD) of the Ministry of Education, Malaysia (KPM.600-3/2/3-eras (17724)). Additionally, written consent was obtained from the national preschool teachers who participate in the study. With help from the state (*Jabatan Pendidikan Negeri*) and district (*Pejabat Pendidikan Daerah*) education officers, a survey form was distributed to the preschool

teachers through WhatsApp groups. All the participants then completed the survey using the online Google Form.

Research Instrument

Early Interventionist Self-Efficacy Scale (EISES) was developed by Lamorey and Wilcox (2005) based on the social cognitive theory of Bandura (1997). It was developed to understand the self-efficacy of early intervention practitioners and the role of efficacy in mediating or moderating the effect of positive child outcomes. EISES was adapted from the Teacher Efficacy Scale (TES) developed by Gibson and Dembo (1984). On top of thirteen items adapted from TES, an additional seven items were added to develop the initial 20-item scale. Then, the adapted instrument was administered to 85 early intervention personnel comprising educators, early interventionists, therapists, specialists and other medical officers to assess its validity and reliability. Subsequently, five items were eliminated based on the result of the reliability test. Due to the improved alpha coefficient following the elimination, the final 15-item EISES was retained. In this regard, the original 15-item EISES is considered a reliable practitioner efficacy scale in the context of early intervention with a high alpha value of 0.78 (Lamorey & Wilcox, 2005).

In the present study, the researcher had adapted the original EISES with some modifications. Specifically targeting preschool teachers, the term “early intervention personnel” in the original EISES was changed to “teacher” as it was a commonly used term in the Malaysian preschool setting (Item 11, 13 and 14). As the current study focused on children with ASD, the term “child/children” in the original EISES was changed to “child/children with ASD” across 13 items (Item 1, 2, 5, 6, 8, 7, 9, 10, 11, 12, 13, 14, 15). With this specification for children with ASD, the modified EISES was renamed as Autism Early Interventionist Self-Efficacy Scale (AEISES). While the original EISES emphasized on early interventionist facilitating the family needs, the AEISES was directed towards the preschool teachers facilitating children with ASD within the school-based instructional context. Furthermore, the implementation of EI programs context was added to all the items to ensure that the modified scale align with the focus of the present study. The AEISES and the original EISES items are shown in Table 1.

Table 1

Comparison of the AEISES Items (In Italics Type) with the Original EISES Items

1	<i>When a child with ASD is having difficulty during the implementation of early intervention programs, I would be able to accurately assess whether the programs required modification.</i>
	Original EISES item: If a family had difficulty implementing plans we have developed, I would be able to accurately assess whether the plans required modification.
2	<i>When a child with ASD shows improvement, it is because I have been effectively supporting the child during the implementation of early intervention programs.</i>
	Original EISES item: When a child shows improvement, it is because I have been effective in facilitating the family's ability to support their child's development.
3	<i>If my supervisor suggests that I change some of my strategies for the early intervention program implementation, I would feel confident that I have the necessary skills to implement the change.</i>
	Original EISES item: If my supervisor suggests that I change some of my strategies for working with families, I would feel confident that I have the necessary skills to implement the change.
4	<i>Throughout the implementation of early intervention programs, I can collaborate well with team members from other disciplines.</i>
	Original EISES item: I can collaborate well with team members from other disciplines.
5	<i>If a child with ASD quickly masters a new skill during the early intervention program, it would probably be because I knew the necessary steps to facilitate their acquisition of skills.</i>
	Original EISES item: If a family masters a strategy quickly, it would probably be because I knew the necessary steps to facilitate their acquisition of skills.
6	<i>Throughout the implementation of early intervention programs, if a child with ASD did not remember information I gave in the previous lesson, I would know how to increase his or her interest and retention for the next lesson.</i>
	Original EISES item: If a family member did not remember information we had covered in a previous visit, I would know how to increase their interest and retention for the next visit.
7	<i>I have enough training to deal with most problems encountered during the implementation of early intervention programs for children with ASD.</i>
	Original EISES item: I have enough training to deal with most problems encountered in providing early intervention services to families and their children.
8	<i>When a child with ASD is having difficulty with a task during the early intervention program, I would be able to accurately assess whether the task was at the correct level of difficulty.</i>
	Original EISES item: When a child is having difficulty with a task, I am usually able to provide the family with suggestions that will work.
9	<i>Through my experiences in the field, I have developed the skills that are necessary to implement early intervention programs for children with ASD.</i>
	Original EISES item: Through my experiences in the field, I have developed the skills that are necessary to serve families well.
10	<i>When I really try during the implementation of early intervention programs, I can get through to the most challenging child with ASD.</i>

Original EISES item: If I really try, I can get through to even the most challenging families.

- 11 *A teacher really cannot do much during the implementation of early intervention programs because most of a child with ASD's performance depends on the home environment.*

Original EISES item: When it comes right down to it, early intervention personnel really can't do much because most of a child's performance depends on the home environment.

- 12 *The amount that a child with ASD will learn during the early intervention program is primarily related to family background.*

Original EISES item: The amount that a child will learn is primarily related to family background.

- 13 *A child with ASD's genetic predisposition for growth and development can negate the best efforts of even a well-prepared teacher of early intervention programs.*

Original EISES item: A child's genetic predisposition for growth and development can negate the best efforts of even a well-prepared early interventionist.

- 14 *Even a teacher with good skills may not reach many children with ASD during the implementation of early intervention programs.*

Original EISES item: Even an early interventionist with good skills may not reach many families.

- 15 *The hours of my early intervention program implementation have little influence on the child with ASD compared to the influence of the child's home environment.*

Original EISES item: Much of the time my efforts are not effective due to a child's background and the lack of community resources.

The original EISES that utilized a 7-point Likert format was modified to be a 10-point rating scale ranging from 1 (strongly disagree) to 10 (strongly agree). According to a Likert scale comparison study by (Malik, 2023), expanding the range of the Likert point scale optimizes the reliability and validity of the measurement. In Malaysia, Malay (*Bahasa Malaysia*) is the national language and widely used in the national education system. Hence, the AEISES in this study was translated into *Bahasa Malaysia* by following translation and back-translation procedures. For the purpose of ensuring better language clarity and understanding among national preschool teachers in Malaysia, the questionnaire used in this study was presented in both English and *Bahasa Malaysia*.

For the purpose of this study, two experts specialized in psychology were recruited to rate how relevant the measurement items were in identifying teacher self-efficacy. In this regard, content validity was assessed using the content validation index (CVI) on a 4-point scale. Items rated as "3" (Relevant) or "4" (Highly Relevant) were designated as valid, whereas items rated "1" or "2" were considered as invalid. Thereafter, the overall CVI was computed based on the proportion of the valid items in the 15-item AEISES. Furthermore, several steps were involved in statistical analysis, including (1) Exploratory Factor Analysis (EFA), (2) Confirmatory Factor Analysis (CFA), (3) convergent validity and (4) measurement of reliability. These statistical analyses were performed using IBM SPSS Statistics 29.0.2.0 while CFA was conducted using SmartPLS 4.1.1.5.

Results

Content Validity

In order to demonstrate adequate content validity, a measurement scale should have a score of at least 0.8 in overall CVI (Yusoff, 2019). As shown in Table 2, the two experts had rated all the items in the AEISES as valid, resulting in a strong overall CVI of 1.0. Thus, the 15-item AEISES was deemed to be relevant and accepted for subsequent psychometric analyses.

Table 2

Content Validation Index

Measurement scale	Total number of items	Expert 1			Expert 2			Overall CVI
		Valid items	Invalid items	CVI	Valid items	Invalid items	CVI	
AEISES	15	15	0	1	15	0	1	1

Exploratory Factor Analysis (EFA)

The collected data was subjected to the EFA to determine the dimensionality of the AEISES scale. The suitability of the 15-item AEISES data for EFA was confirmed based on the Kaiser-Meyer-Olkin (KMO) value of 0.940 and the statistical significance of Bartlett's test of sphericity ($\chi^2 = 3475.53$, $df = 105$, $p < 0.001$). The EFA of the 15-item scale revealed two significant factors with eigenvalues of 7.901 and 3.765 (greater than 1.0), accounted for 78.88% of the total variance.

Furthermore, parallel analysis and the minimum average partial test were employed to confirmed a two-factor model. As shown in Table 3, the first factor included nine items that explained 59.73% of the variance while the second factor consisted of four items that explained 28.15% of the variance. Consistent with the original EISES, the two factors were named Personal Intervention Efficacy (PIE) and General Intervention Efficacy (GIE).

Next, item 4 and 13 (Table 1) were deleted due to a low communality score (below 0.5) (Hair, 2009). The remaining 13-item scale explained a total variance of 87.88%. Thereafter, the obtained two-factor structure was reconfirmed using a scree plot, revealing a definite break after the second component.

Table 3

Factor Analysis of the Autism Early Interventionist Self-Efficacy Scale (AEISES)

Communality	Items	Factor 1 (PIE) Loading	Factor 2 (GIE) Loading
0.866	When a child with ASD is having difficulty during the implementation of early intervention programs, I would be able to accurately assess whether the programs required modification.	0.931	
0.895	When a child with ASD shows improvement, it is because I have been effectively supporting the child during the implementation of early intervention programs.	0.946	
0.887	If my supervisor suggests that I change some of my strategies for the early intervention program implementation, I would feel confident that I have the necessary skills to implement the change.	0.941	
0.851	If a child with ASD quickly masters a new skill during the early intervention program, it would probably be because I knew the necessary steps to facilitate their acquisition of skills.	0.921	
0.868	Throughout the implementation of early intervention programs, if a child with ASD did not remember information I gave in the previous lesson, I would know how to increase his or her interest and retention for the next lesson.	0.931	
0.871	I have enough training to deal with most problems encountered during the implementation of early intervention programs for children with ASD.	0.933	
0.849	When a child with ASD is having difficulty with a task during the early intervention program, I would be able to accurately assess whether the task was at the correct level of difficulty.	0.921	
0.839	Through my experiences in the field, I have developed the skills that are necessary to implement early intervention programs for children with ASD.	0.916	
0.843	When I really try during the implementation of early intervention programs, I can get through to the most challenging child with ASD.	0.918	
0.945	A teacher really cannot do much during the implementation of early intervention programs because most of a child with ASD's performance depends on the home environment.		0.972
0.927	The amount that a child with ASD will learn during the early intervention program is primarily related to family background.		0.963
0.926	Even a teacher with good skills may not reach many children with ASD during the implementation of early intervention programs.		0.963
0.857	The hours of my early intervention program implementation have little influence on the child with ASD compared to the influence of the child's home environment.		0.925
Eigenvalues		7.901	3.765
% of the variance explained		59.73	28.15
Cronbach's alpha		$\alpha = 0.983$	$\alpha = 0.977$

Confirmatory Factor Analysis (CFA)

The CFA was performed to validate the factor structure identified by the EFA. As shown in Table 4, the two-factors model structure was found to have 2.091 on normed Chi-square (χ^2/df); 0.080 on Root Mean Square Error of Approximation (RMSEA); 0.023 on Standardized

Root Mean Square Residual (SRMR); 0.980 on Comparative-Fit Index (CFI); 0.975 on Tucker-Lewis Index (TLI) and 0.890 on Goodness-of-Fit Index (GFI).

These data have demonstrated that the two-factor model structure for 13-item AEISES in the present study had a good model fit and was structurally valid. The final factorial graphical solution of the 13-item AEISES was shown in Figure 1.

Table 4

Measurement Model Fit Indices

Goodness-of-fit indices	Threshold value for good fit	Actual value
χ^2/df	3.00 or lower	2.091
RMSEA	0.08 or lower	0.080
SRMR	0.08 or lower	0.023
CFI	0.90 or higher	0.980
TLI	0.90 or higher	0.975
GFI	0.90 or higher	0.890

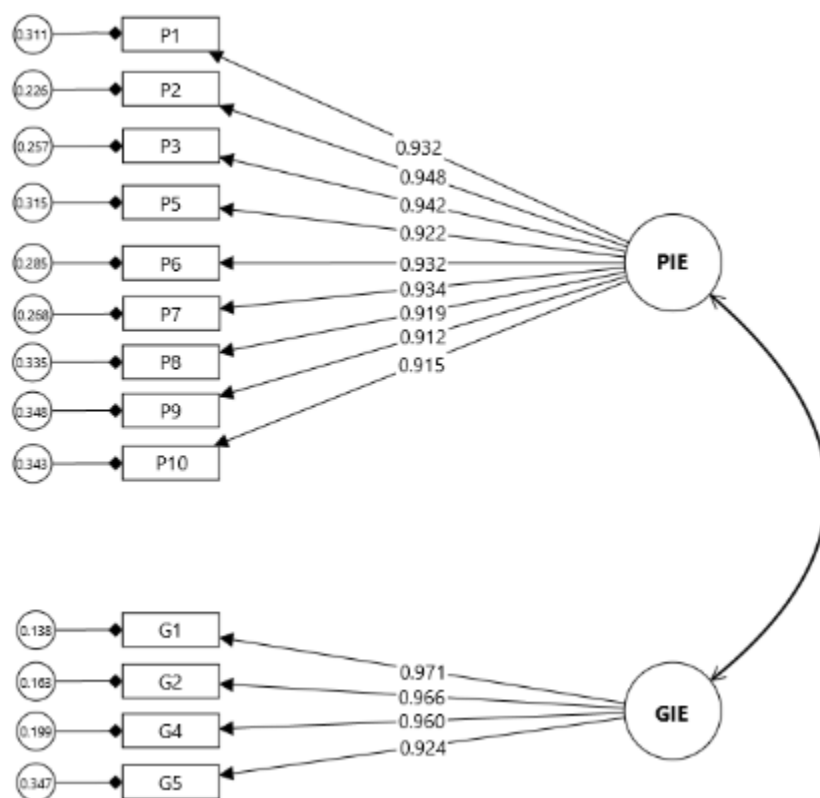


Figure 1. Path diagram for the CFA of the autism early interventionist self-efficacy scale (AEISES)

Convergent Validity

Convergent validity was assessed using factor loadings, Average Variance Extracted (AVE) and Composite Reliability (CR). It was found that all the standardized factor loadings for the 13 measurement items were higher than 0.60 (Figure 1). The AVE values for both PIE and GIE (0.862 and 0.913) were also higher than the recommended threshold of 0.50 (Fornell & Larcker, 1981), suggesting that each construct accounts for the majority of variance in its items, thus confirming adequate convergent validity. In addition, the high value of CR (PIE =

0.983 and GIE = 0.977) indicated strong internal consistency. These results support the convergent validity of the AEISES.

Reliability

Internal consistency tests were conducted on the entire sample (N = 169) to determine the reliability of the AEISES scale. The current data produced excellent values of Cronbach's alpha with α for the total AEISES scale was 0.916 and the internal consistency coefficients of the two factors were 0.983 and 0.977 respectively. According to Hinton et al. (2014), Cronbach's alpha points of 0.90 and above are considered excellent reliability. The results suggested that AEISES was a reliable instrument for measuring self-efficacy among preschool teachers who implement EI program for children with ASD.

Discussion

The Early Interventionist Self-efficacy Scale (EISES) was designed to identify the self-efficacy of early intervention practitioners (Lamorey & Wilcox, 2005). Although it has been used as a reliable practitioner efficacy scale in early intervention, the scale has yet to be validated for use in the Malaysia context. Therefore, the present study mainly focuses on modifying the instrument to address contextual appropriateness and validating its psychometric properties in a sample of preschool teachers who implement EI programs for children with ASD in national preschools in Malaysia.

The initial step in measuring the items' quality of the Autism Early Interventionist Self-Efficacy Scale (AEISES) was done by assessing its content validity. In this regard, two experts in psychology had been employed to rate the scale. Their evaluation produced a strong overall content validity index of 1.0, which provided a solid foundation basis for the scale for further psychometric analyses. Subsequently, construct validity of the AEISES was examined using both exploratory and confirmatory factor analysis. The preliminary EFA results of the 15-item AEISES revealed two significant factors accounted for 78.88% of the total variance. The identified factors correspond to the two fundamental dimensions described in Bandura's Theory of Self-Efficacy: personal efficacy beliefs and outcome expectations. The first factor, Personal Intervention Efficacy (PIE), reflects preschool teachers' beliefs about their own competence in implementing EI effectively for students with ASD, mirroring Bandura's personal efficacy dimension that concerns one's capability to execute required behaviors. The second factor, General Intervention Efficacy (GIE), represents preschool teachers' beliefs about the potential of EI to improve developmental and learning outcomes of children with ASD, paralleling Bandura's outcome expectation dimension regarding the anticipated consequences of those behaviors.

As a result of low communality score, item 4 (Throughout the early intervention program implementation, I collaborate well with team members from other disciplines) was removed. The reason for low communality could be due to the differences in service delivery structures between contexts. In the original EISES development context (Lamorey & Wilcox, 2005), early intervention services in the United States operate within well-established multi-disciplinary team frameworks, where early interventionists routinely collaborate with educator, early interventionist, therapist, specialist and other medical officers. In contrast, Malaysian national preschools providing early intervention services typically involved a qualified preschool teacher working alongside an assistant teacher, without access to on-site

multidisciplinary teams. Thus, interdisciplinary collaboration is not a regular feature of the Malaysian national preschool teachers' professional experience. This structural difference in service delivery models explains why item 4, which assumes routine multidisciplinary collaboration, demonstrated poor loadings with Malaysian preschool teachers.

In addition, item 13 (A child with ASD's genetic predisposition for growth and development can negate the best efforts of even a well-prepared teacher of the early intervention program) was also removed due to low communality. This item is problematic in the context as it directs attention towards unmodifiable biological factors rather than malleable, instructional variables and family factors. Furthermore, the item contradicts substantial empirical evidence demonstrating that high-quality EI produces significant developmental gains for children with ASD. Removal of this item therefore strengthens the scale's coherence with the empowering premise that teachers can meaningfully influence outcomes through quality instruction despite challenging student characteristics. Following the deletion of items 4 and 13, the final EFA results supported a two-factor structure, extracted 87.88% of the total variance.

The CFA results demonstrated that the two-factor model fits well with the data ($\chi^2/df=2.091$, CFI=0.980, RMSEA=0.080). Pertaining to these findings, the presence of the two components were consistent with previous overseas research on teacher efficacy scales (Brouwers et al., 2002; Deemer & Minke, 1999; Gibson & Dembo, 1984; Lin & Gorrell, 2001; Woolfolk & Hoy, 1990; Yuen et al., 2003) as well as among Malaysian teachers (Abdullah & Laji, 2016; Ebbie et al., 2019; Jerry, 2010). Consistent with a study by Lamorey and Wilcox (Lamorey & Wilcox, 2005) which focused on early intervention, the first factor for the 13-item EISES used in the present study was named Personal Intervention Efficacy (PIE) while the second factor was named General Intervention Efficacy (GIE).

Apart from the stable factor structure, the 13-item AEISES also demonstrated strong evidence of internal consistency. As indicated by Cronbach's alpha coefficient of 0.916, the overall reliability of the scale was excellent. Furthermore, convergent validity was strongly supported by the AVE values for both PIE and GIE (0.862 and 0.913) which were both above the recommended threshold of 0.50 (Fornell & Larcker, 1981). Based on these statistical results, the 13-item AEISES was found to be a valid and reliable self-reporting questionnaire for identifying self-efficacy among preschool teachers who implement early intervention programs for children with ASD in Malaysia.

The adaptation and validation of the scale, AEISES addresses the notable absence of measures specifically designed to assess self-efficacy among preschool teachers serving population with special needs, particularly children with ASD in early intervention contexts. As the first validated instrument for measuring preschool teacher self-efficacy in implementing EI programs for children with ASD, the AEISES fills a critical gap in the assessment tools for special education research and practice. By accounting for the contextual, cultural and systemic differences between the Malaysian educational system and Western contexts where most efficacy scales originate, the AEISES addresses the need for culturally and contextually appropriate measurement that reflect the realities of national preschool settings in developing countries. Moreover, the successful adaptation and validation of the AEISES for the ASD-specific context provides methodological evidence

supporting further modification of the instrument for teachers serving children with other disabilities or special needs.

This instrument provides a valuable tool for evaluating the effectiveness of teacher education and professional development programs focused on equipping preschool teachers with the knowledge and skills necessary to implement EI programs for children with ASD. By assessing teachers' self-efficacy across different aspects of EI implementation, the AEISES enables identification of specific areas where teachers require additional support, thereby informing targeted professional development initiatives and resource allocation decisions. Furthermore, the scale helps to establish baseline data on preschool teacher efficacy in Malaysian national preschools, providing essential information for policy development and program evaluation. Beyond professional development applications, baseline efficacy data can guide efforts to establish stronger infrastructure for multidisciplinary support networks, addressing the current limitation wherein national preschool teachers typically work with limited access to specialists. Despite the promising results, this study has several limitations. First, the instrument used in this study required participants to self-disclose details that are perceived as sensitive information. In this case, response bias is a common issue, especially when a self-reported questionnaire is used. When reporting about their own self-efficacy, preschool teachers may tend to 'over-report' due to the social desirability effect. As a result, the self-efficacy scores obtained may not always be fully accurate and could be higher than the actual level. Future research could reduce this problem by involving supervisors or peers to perform cross-validation of the self-reported data.

Secondly, this study only involved preschool teachers who implement EI programs for children with ASD in national preschools in Malaysia. In fact, there are many private institutions and non-government organizations that also provide EI programs for children with ASD but with different funding and resources from the government. Concerning these factors, the findings in the current study may not be generalized to the private sector and therefore future research in the same area is certainly worth conducting. In this regard, comparing the AEISES in different settings could lead to identifying the discrepancies of self-efficacy, which may reflect in better variation in training, resources and support.

Conclusion

This study successfully modified and validated Autism Early Interventionist Self-Efficacy Scale (AEISES), demonstrating robust psychometric properties through exploratory and confirmatory factor analyses. The final 13-item instrument exhibited a two-factor model structure comprising Personal Intervention Efficacy and General Intervention Efficacy, accounting for 87.88% of total variance, strong convergent validity and excellent content validity. As a conclusion, AEISES is a reliable and valid instrument to identify self-efficacy among preschool teachers who implement EI programs for children with ASD.

The current study provides empirical evidence to support the theoretical understanding of self-efficacy, particularly among preschool teachers of children with ASD. It contributes to the body of knowledge in the context of EI program implementation by providing useful and important information for researchers, educators and policymakers to better understand the development of teacher self-efficacy especially in early intervention settings. Ultimately, the AEISES fills a critical gap in special education assessment and provides

a practical tool for professional development evaluation and policy planning. As existing studies are mostly based in Western contexts, this study addresses a gap in the literature by providing a more culturally relevant insight that focuses on the EI program implementation in Malaysia. Future research should examine criterion and construct validity against other established measurements specific to early intervention and preschool contexts to strengthen the instruments' validity evidence and support its broader application in research and practice.

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